

REMARKS

Claims 1, 4, 8 and 15 are amended. Claims 1-22 are now active in this application. No new matter has been added.

The continued indication that claims 2, 9-13 and 16 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims is acknowledged and appreciated.

AMENDMENTS TO CLAIMS

While Applicant considers that no amendment is basically necessary, with a view to clarifying the subject matter and without changing the scope of the claims, claims 1, 4, 8 and 15 are amended as follows:

(1) Claims 1 and 8

In line 5 of claim 1, "original vertices" is changed to "original vertices before the deformation". The same amendment is made with respect to claim 8.

(2) Claim 4

In claim 4, the first claimed element beginning at line 3 is amended as follows:

calculating respective estimation values based on a predetermined estimation method for a plurality of portions of a polygon model that are to be deformed by converging two or more vertices of the polygon model;

The wherein clause of claim 4, beginning at line 9, is amended as follows:

wherein before each data reduction, the portion that the estimation value thereof is necessary to be recalculated for the undetermined estimation method as a result of the previous data reduction is defined as a reduction prohibition area, and a succeeding data reduction is applied to a portion other than the reduction prohibition area.

(3) Claim 15

In claim 15, line 4, the first claimed element is amended as follows:

an estimation value calculator which calculates respective estimation values based on a predetermined estimation method for a plurality of portions of a polygon model that are to be deformed by converging two or more vertices of the polygon model;

The final claimed element of claim 15, beginning at line 11, is amended as follows:

a prohibition area defining device which defines a portion that the estimation value thereof is necessary to be recalculated for the predetermined estimation method as a result of the previous data reduction executed by the data reducing device as a prohibition area to keep a succeeding data reduction from being applied.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 103

I. Claims 1, 3, 8 and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland et al. in view of Zarge et al., for the reasons substantially of record.

Claims 4-7, 15, 17-19, 21 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland et al. in view of Li et al., for the reasons substantially of record.

Claim 20 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Garland et al. in view of Li et al., as applied to claim 15, and further in view of Zarge et al.

II. The rejections are respectfully traversed.

Regarding independent claims 1 and 8

The Examiner cites Garland et al. as a main reference with respect to rejecting these claims. Garland et al. discloses that estimation is made based on the distances between the *vertices* of the polygon model before approximation and *the respective surfaces* of the polygon model after approximation. In contrast, the present invention is directed to performing estimation based on the distances between the *respective planes* of the polygon model before approximation and the *vertices* of the polygon model after approximation. In other words, the manner of estimation of Garland et al. *is opposite to that of the claimed invention.*

The Examiner points out in page 1 of the Official Action that the following is disclosed in Garland et al.:

“... We can associate a set of planes ... we can define the error of the vertex with respect to this set as the sum of squared distances to it planes...”, and “... Compute the Q matrices for all initial vertices ..., The error.. of this target vertex becomes the cost of contracting this pair ...

place all the pairs in a heap keyed on cost ... Iteratively remove the pair ... update the costs of all valid pairs involved...”.

However, Applicant believes that these descriptions, in reality, show the differences between Garland et al. and the present application. The above-mentioned Q matrices are computed with respect to the respective primary (before approximation) vertex. The Q matrices are computed from a primary plane relating to the vertexes. See the formula (2) in the 5th chapter of Garland et al. Further, Garland et al. discloses that an error of a target vertex is estimated to contract the minimum cost pair. See items 3, 4, and 5 of the 4.1st chapter of Garland et al.

That is, parameters directly or indirectly referred to with respect to the computation for the estimation are a primary vertex, a primary plane, and the target vertex after the contraction. Thus, there is no disclosure with respect to a plane after the contraction. Accordingly, Applicant believes that Garland et al. does not require the plane after the contraction. This is a substantial difference between Garland et al. and the present invention.

As delineate in MPEP § 2143.03, the Examiner must consider all words in a claim when establishing obviousness of a claimed invention by a combination of references. This has not been done with respect to independent claims 1 and 8.

In view of the above, even if Zarge et al. discloses “comparing the computed estimation value with the predetermined value...”, the features recited in claims 1 and 8 of the present applicant are neither disclosed nor suggested by Garland et al. and Zarge et al., considered alone or in combination. Thus, independent claims 1 and 8 are patentable over Garland et al. and Zarge et al., as are dependent claims 3 and 14. Consequently, the

allowance of independent claims 1 8, as well as dependent claims 3 and 14, is respectfully solicited.

Regarding independent claims 4 and 15

The Examiner admits that Garland et al. does not disclose wherein before each data reduction, the portion that the estimation value thereof is necessary to be recalculated as a result of the previous data reductions is defined as a reduction prohibition area, and a succeeding data reduction is applied to a portion other than the reduction prohibition area. See the Official Action, page 2, 4th line from the bottom to the bottom line.

However, the Examiner identifies the following disclosures from Li et al.:

“... two edge collapse operations ... are independent of each other if they do not share any common vertex ... a mesh simplification may be conducted ... where independent edge collapses are performed in the same layer...”.

Then, the Examiner states that it would have been obvious to a person of ordinary skill in the art to modify the method of Garland et al. to perform independent edge collapses, as taught by Li et al. on the ground that Garland et al. discloses the estimation values are only recalculated for those portions previously involved in a removal. See the Official Action, last line of page 2 to line 9 of page 3.

However, even if the applied prior art references could be combined as suggested by the Examiner, Li et al. fails to disclose that the portion having been involved in all the previous data reductions is defined as a reduction prohibition area. The portion necessary to be recalculated regarding the estimation value is defined in accordance with the

calculation means of the estimation value. That is, when a certain estimation method is adopted, the recalculation may not be required even for the portion related to the data reduction. On the other hand, when another estimation method is adopted, the recalculation may be required even when the portion does not relate to the data reduction. For example, when vertexes involved in an area within a predetermined distance are used for the estimation of the target area in a polygon model, all the vertexes within the area cannot be deformed even when the data of the targeted vertex is reduced. However, the estimation value is required to be recomputed.

In Li et al., "vertex is independent of each other" requires only "vertex are not shared". There is no disclosure or suggestion in Li et al. that a portion needed to be recalculated with respect to the estimation value is defined as a reduction prohibition area. Accordingly, the subject matter of independent claims 4 and 15 does not result even when the method of Garland et al. is modified in view of the teaching of Li et al.

Thus, independent claims 4 and 15 are patentable over Garland et al. and Li et al., considered alone or in combination. Consequently, the allowance of independent claims 4 and 15, as well as dependent claims 5-7 and 17-22, is respectfully solicited.

CONCLUSION

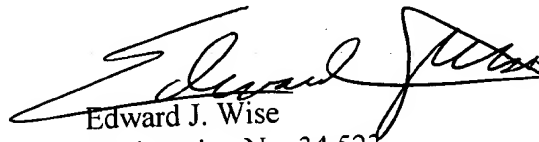
Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

09/748,141

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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